

# PAN-Theory

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A unified theory of fundamental interactions represents today one of the most advanced research sectors. To it are linked the expectations about new worldviews and new implications on the technological and industrial processes for the evolution of the human species. At this unification process, it is assigned a general understanding of phenomena. In this article, we present an alternative theory we call PAN-Theory. The PAN-Theory provides a simple mechanical-algebraic model that proves to be exactly the Coulomb's interaction; therefore we demonstrate the elementary charge  $e$  and Planck's constant  $h$  to be expression of other constants with negligible errors. By the definition of a mass-time relation the presented Theory obtains and interprets in a new way the fine-structure constant  $\alpha$  and estimates the proton radius in an agreed extent with the most complex and current models. By the use of PAN-Theory a relativistic mass-energy relation is demonstrated and the wave-particle duality is presented in a new aesthetic. The final product of the presented theory is the expression of Newtonian gravity model as isomorphism of Coulomb model with negligible errors. In appendix a short demonstration for Doppler effect and for quantum entanglement is given.

## I. THE PAN-THEORY AXIOMS

We presently assume the atomic matter to be constituted by subatomic particles having the following properties:

1. The generic subatomic particle, named "**primary matter**", is a cluster (conglomerate) of two types of matter-bricks called  $PAN^+$  and  $PAN^-$  with the same mass  $m_0$  and the same radius.
2. Exists a minimal cluster for each type of PAN (both + and -) that interacts with matters. We'll call this minimal cluster **PANONE**: he's formed by a mean number  $\check{\alpha}$  of PANs and it has radius is  $\frac{\lambda_0}{2}$ .
3. Every type of cluster has no fixed geometry but it is built up maximizing order and minimizing vacuum within it.
4. We assume the mass  $m_e$  of the primary matter considered here to be much larger than the mass  $\check{\alpha}m_0$  of the single PANONE, i.e.,  $m_e \gg \check{\alpha}m_0$ .
5. The primary matter is intrinsically unstable and emits PANONES in space at the rate (emission frequency)  $\nu_0 = \frac{1}{t_0}$ . The velocity of each emitted PANONE is  $v_0$ , see eqs. (3 4 5).
6. The total amount of emitted mass in each emission is

$$M_e = 2n \cdot \check{\alpha}m_0 \quad (1)$$

$n \geq 1 \in \{1, 2, 3, \dots\} \subseteq \mathbb{N}^+$  except the emissions in condition as in axiom 9.

7. For each emission the conservation of motion quantity is respected.

$$\sum_{i=1}^{2n} \check{\alpha}m_0 v_0 \hat{r}_i = \bar{\theta} \quad (2)$$

where  $\bar{\theta}$  is the null vector and  $\hat{r}_i$  is the versor of  $i$ -th emitted PANONE.

8. We further assume that no external force drives the emission mechanisms among PAN and other matter. This amounts to consider momentum conservation as the basic mechanism ruling the interaction among bodies mediated by PANs.
9. Each emitted PANONE from a primary matter object may impinge on the surface of a second object of primary matter. Each collision is assumed to be:
  - (a) **perfectly inelastic** in case of colliding matter of the same type giving rise to the mass  $m_e$  of the primary matter to increase by the total mass of the PANONES impinging on the surface.
  - (b) **elastic** in case of collision interesting two different types of matter, in this case surface part of  $m_e$  interested from the collision with a different type of PAN became inactive and it can be reactivate only by the collision with a further PANONE of the same type of primary matter.
  - (c) For the sake of simplicity, in the derivation of the most important consequences of the existence of PANs we consider two spherical bodies of primary matter with equal radius  $R$  and mass  $m_e$ , at a distance  $d \gg R$

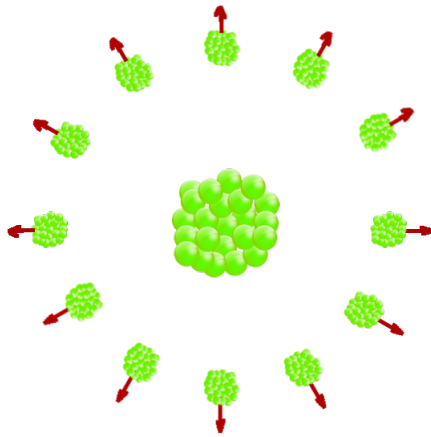


Figure 1: Panone's isotropic emission.

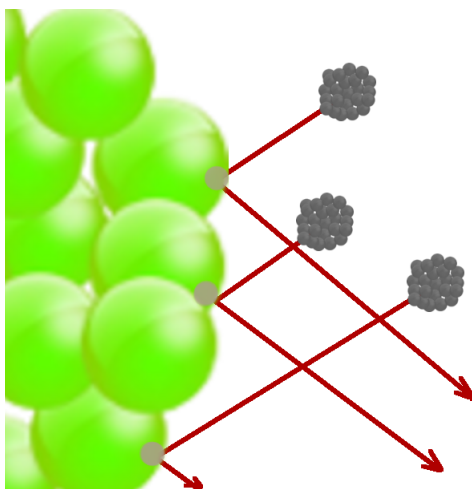


Figure 2: Example of elastic Panone collisions with primary matter. In dark green we can observe the inactive surface of primary matter after a collision.

## II. DEFINITION OF A CLOCK

Let  $\lambda_0$  be the smallest length that we are able to measure, i.e. the inferior limit in any length measurement process. If we further assume the PANONE to move in an isotropic multidimensional space, let  $\lambda_0$  represent the diameter of the smallest sphere  $S$  limiting the measurable space occupied by PANONE. If the motion of PANONE is restricted to  $S$  then it will consist, in absence of external forces, in a back-and-forth displacement that we can describe by a full oscillation of length  $2\lambda_0$  and period  $t_0$ . We take  $t_0$  as the shortest time we are able to measure in the sense that any time measurement must give integer multiples of  $t_0$ . We call this system the *elemental clock for a natural phenomenon*. The speed of PANONE is then given by :

$$v_0 = \frac{2\lambda_0}{t_0} \quad (3)$$

and represents the upper limit speed of any similar clock since, according to the definition of the minimal clock and 3 we have for a generic speed  $v_k$ :

$$v_k = \frac{2n_k \lambda_0}{m_k t_0} \quad (4)$$

where  $n_k$ ,  $m_k$ , are positive integers restricted by  $m_k \leq n_k$ . The equality sign just describes a slower minimal clock with the same velocity in eq. 3 for the natural phenomenon stating that the velocity of the natural clock is the same for all clocks and is an even multiple of the ratio between the two fundamental quantities  $\lambda_0$  and  $t_0$  characteristic of the phenomenon. We assume the limit speed for phenomena measured by the elemental clock to be the light velocity

$$c = 299.792.458 \left[ \frac{m}{s} \right] \quad (5)$$

according to the 2014 CODATA value[1].

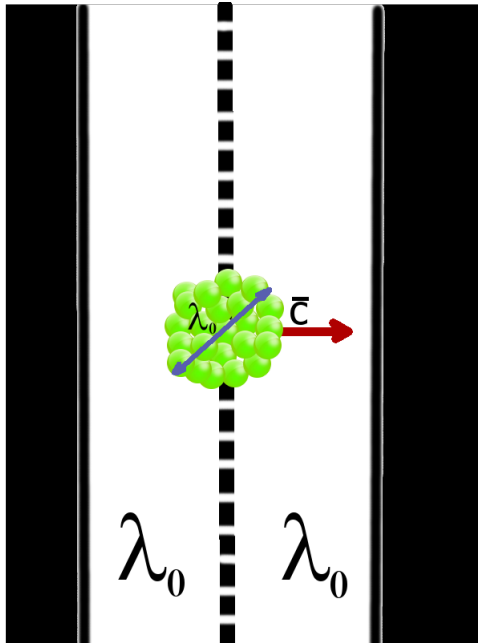


Figure 3: Minimal Clock.

### III. FIRST CONSEQUENCE OF THE PAN-AXIOMS: THE NUMBER $\aleph$ OF EMITTED PANONES

As a consequence of the above hypotheses, the PAN-theory excludes the concept of distance forces, like gravitational and Colombian ones. The interaction among matter is, instead, ascribed to a mechanism of momentum exchange due to PANONE-particles emitted from a body and impinging on the external surface of some other body of primary matter. A quantity to be considered next is therefore the number  $\aleph$  of emitted PANONES from a spherical body of radius  $R \gg \lambda_0$ . In the simplest picture of isotropic emission mechanism, we consider  $\lambda_0$  just equal to the thickness of the outermost shell containing  $\aleph$  PANONES to be emitted and  $\frac{\pi}{6} \lambda_0^3$  as the loss of volume for each emitted PANONE.

$$n = \frac{\aleph}{4\pi d^2}$$

The body will, therefore, undergo a volume loss  $V_d$ , due to the "peel off" of the  $\aleph$  emitted PANONE, amounting to:

$$V_d = \frac{4}{3}\pi \left[ R^3 - (R - \lambda_0)^3 \right] = \frac{4}{3}\pi (3R^2\lambda_0 - 3R\lambda_0^2 - \lambda_0^3) \quad (6)$$

Considering that  $R \gg \lambda_0$ ,  $V_d$  can be approximated by:

$$V_d \cong 4\pi R^2 \lambda_0 \quad (7)$$

with an error amounting to:

$$\epsilon_{Vd} = \frac{\lambda_0^2}{R^2} - \frac{\lambda_0}{R} \cong \frac{\lambda_0}{R} \approx 0. \quad (8)$$

The number  $\aleph$  can be thus easily obtained dividing  $V_d$  by the volume occupied by one PAN and considering  $R = n_R \lambda_0$ , this simply yields:

$$\aleph = 24n_R^2 \quad (9)$$

The last equation automatically fully respects the axiom (6) in his equation 1. Then the eq. 9 is a consequence of axiom (6) and vice-versa.

#### IV. PAN-THEORY: SECONDARY CONSEQUENCE

Suppose we have in the ideally empty space two spheres of primary matter mass respectively  $m_{e1}$  and  $m_{e2}$  which interact each others by exchanging PANONES as defined in the hypothesis.

The PANONE issued by the first mass  $m_{e1}$  impact on mass  $m_{e2}$ . The mass  $m_{e2}$  in turn emits PANONES that are intercepted by the mass  $m_{e1}$ . It shows that for the conservation of momentum and in a totally intuitive we can affirm that the bodies tend to approach (move away, respectively) along the straight line joining the two centers of gravity if the two masses of primary field are different (equal, respectively). The momentum per unit of surface at any distance  $d$  emitted from the generic particle  $\bar{q}_e$  is expressible as follows:

$$\bar{q}_e = \frac{\aleph \check{\alpha} m_0 \bar{v}_0}{4\pi d^2} \quad (10)$$

where  $m_0$  is the mass of a single PAN, and where  $\bar{v}_0$  is the speed of the PANONES. The change in the amount of motion because of collisions with PANONES intercepted by  $m_{e2}$  will then:

$$\bar{q}_2 = \frac{\aleph \check{\alpha} m_0 \bar{v}_0}{4\pi d^2} \cdot \pi R^2 \quad (11)$$

If we multiply both quantity for the emission frequency  $\nu_0$  and we take count of the double effect ( $m_{e1}$  on  $m_{e2}$  and vice-versa) we get the total variation of amount of motion is:

$$\bar{q}\nu_0 = \frac{\aleph \check{\alpha} m_0 \bar{v}_0}{2\pi d^2} \cdot \Sigma_e \nu_0 \quad (12)$$

The equation 12 is the dimension of a force. It also notes that the quantity  $\check{\alpha} \aleph m_0$  is the amount of total mass emitted into free space from the body  $m_{e1}$ .

#### V. A NEW MODEL FOR THE INTERPRETATION OF THE COULOMB FORCES AND THE SOMMERFELD'S CONSTANT

I impose that the Planck's constant  $h$  is a short form for PANONE's mass, number of emitted PANONES, primary matter minimal surface and the emission frequency:

$$h \triangleq \aleph \check{\alpha} m_0 \Sigma_e \nu_0 \quad (13)$$

We must here emphasize that the axioms (6) and (7) imply the Planck's constant and vice versa. By considering the Sommerfeld's expression of fine-structure constant[2] we can write:

$$h = 2\pi \frac{ke^2}{\alpha c} \quad (14)$$

where  $\alpha$  is the *fine structure constant*,  $k$  is Coulomb's constant and  $e$  is the elementary charge. By dividing both quantities for a distance  $d^2$  and moving  $c$  to the left side of equation 14:

$$\frac{h}{2\pi d^2} c = \frac{1}{\alpha} \cdot \frac{ke^2}{d^2} \quad (15)$$

using the eq. 13 in 15

$$\check{\alpha} \cdot \frac{\aleph m_0 c \Sigma_e \nu_0}{2\pi d^2} = \frac{1}{\alpha} \cdot \frac{ke^2}{d^2} \quad (16)$$

what we can observe on the left side of eq. 16 is exactly the equation 12 of PAN-Theory model. By placing:

$$\begin{cases} \check{\alpha} \triangleq \frac{1}{\alpha} \\ v_0 = c \end{cases} \quad (17)$$

we demonstrate that the PAN-interaction between two masses of primary matter is exactly the Colombian interaction between two elementary charges:

$$\frac{\aleph m_0 c \Sigma_e \nu_0}{2\pi d^2} = k \frac{e^2}{d^2} \quad (18)$$

Now we can give a microscopic interpretation of the Sommerfeld's constant:  $\alpha^{-1}$  **is the average number of PANs in an emitted PANONE**. And the speed of each PANONE is  $c$ .

For the sake of simplicity of this article we'll define  $\gamma_c$  as following:

$$\gamma_c = 2\pi \frac{ke^2}{c} \quad (19)$$

We can write an *identity of fine structure*:

$$\check{\alpha} \frac{\gamma_c}{h} = \frac{\gamma_c}{h\alpha} = 1 \quad (20)$$

## VI. THE MASS-TIME RELATION AND A REDEFINITION OF THE PLANCK'S CONSTANT

By the use of equations 13 we can write:

$$\begin{aligned} h &= \aleph \frac{m_0}{\alpha} \Sigma_e \nu_0 \\ \aleph \frac{m_0}{\alpha} \pi (n_R \lambda_0)^2 \nu_0 &= \frac{2\pi ke^2}{\alpha c} \end{aligned} \quad (21)$$

where we used the relation  $\Sigma_e = \pi R^2 = \pi (n_R \lambda_0)^2$ . Multiplying both members by  $8\nu_0$ :

$$2n_R^2 \aleph m_0 = 16 \frac{ke^2}{c^3} \nu_0$$

placing  $\mathfrak{M}_L = 2n_R^2 \aleph m_0$  we come to a constituent relation for mass-time:

$$\frac{\mathfrak{M}_L}{\nu_0} = 16 \frac{ke^2}{c^3} = 136,999839893 \cdot 10^{-54} [kg \cdot s] \quad (22)$$

The eq. 22 expresses a mass-time relation, its value is so close to the fine-structure constant, so that we could redefine the fine-structure as following:

$$\alpha \triangleq \frac{\nu_0}{\mathfrak{M}_L} \chi \quad (23)$$

Where  $\chi = 0,999736133 \cdot 10^{-54} [kg \cdot s] \cong 10^{-54} [kg \cdot s]$ . This additional definition of  $\alpha$  is fully consistent with the meaning expressed in eq. 17. By comparing the equations 20 and 23:

$$\begin{cases} h = \frac{\gamma c}{\alpha} \\ \frac{1}{\alpha} = 16 \frac{ke^2}{c^3 \chi} \end{cases} \quad (24)$$

by considering  $k^2 = \frac{c^4 \mu_0^2}{16\pi^2}$  we can express Planck's constant in a new form:

$$h = \begin{cases} h_a = \frac{2}{\pi \chi} \mu_0^2 e^4 \\ h_b = \frac{\pi c^2}{8\alpha^2} \chi \end{cases} \quad (25)$$

the mean value for  $h$  in eq. 25 give us an error  $\varepsilon_h$  on the CODATA value of Planck's constant[1] as following:

$$\varepsilon_h = \frac{\left| \frac{h_a + h_b}{2} - h_{codata} \right|}{h_{codata}} \cong 7 \cdot 10^{-8} \quad (26)$$

It is observed that Planck's constant is not a primary constant of the universe, but we can express it as a function of other constants. This makes us suspect that, in line with what has been said, even the elementary charge is not a fundamental constant of universe but only a derived constant. We will prove it.

## VII. A NEW DEFINITION OF THE ELEMENTARY CHARGE AND THE MASS-ENERGY EQUIVALENCE

Direct from eq. 25 we obtain the value of the elementary charge:

$$e = \mp \sqrt{\frac{\pi c \chi}{4\alpha \mu_0}} = \mp \sqrt{\frac{\pi \mathfrak{m}_L c}{4\nu_0 \mu_0}} \quad (27)$$

the precision of the obtained value for the elementary charge to the CODATA values[1] is:

$$\varepsilon_e = \frac{|e - e_{codata}|}{e_{codata}} \cong 4,5 \cdot 10^{-16} \quad (28)$$

we observe also that the positive and negative charges is only a consequence of PAN-Theory axioms, then the equation 27 shows that PAN-Theory is a more general isomorphism who could replace the classical electromagnetic theory. By the use of simple substitutions it is also observed that:

$$16 \frac{\alpha \hbar}{c^2} = \frac{\mathfrak{m}_L}{\nu_0} \quad (29)$$

it points out that:

$$E_0 = 2h\nu_0 = \frac{hc}{\lambda_0} = \frac{1}{2} \left( \frac{\pi}{2\alpha} \mathfrak{m}_L \right) c^2 \quad (30)$$

The pseudo-mass  $\frac{\pi}{2\alpha} \mathfrak{m}_L$  expressed in eq. 30 represents exactly the total mass released in free space at speed  $c$  from a body in form of PANONES multiplied by the impinging surface and normalized by  $\lambda_0^2$ .

This equation relates the emission phenomenon of PANONES with the classical energy for an emitted photon. If you want to describe the emitted pseudo-mass as a wave you could consider the minimal clock's length  $\lambda_0$  as a wavelength of a wave who propagates with speed  $c$ , then  $\lambda_0 = \frac{c}{\nu_0}$ , it points out:

$$h\check{\nu}_0 = \frac{1}{2} \left( \frac{\pi}{2\alpha} \mathfrak{m}_L \right) c^2 \quad (31)$$

Where  $\check{\nu}_0$  is the frequency associated to the wave. Then for a general amount of mass  $m$  we can write more generally:

$$h\check{\nu} = \frac{1}{2} mc^2 \quad (32)$$

Last equation could be considered the final equation of wave-particle duality, it expresses at the same time the mass-energy principia and the fundamental behavior of matter in PAN-Theory. The deeper meaning of the equation 30 is a synthetic form that encloses the model assumed: the matter (in bulk form) is dispersed disintegrating itself into PANONES. In eq. 31 the member to the left side is the maximum energy that can have a classic photon when considered to be a wave. The member to the right represents the *equivalent mass of the photon* when it is regarded as a particle. So in general by the eq. 32 we can give mass to any photon with general frequency  $\nu$  as a "**mass equivalent particle**" equal to:

$$m_{\text{photon}} = \frac{2h\nu}{c^2} \quad (33)$$

By placing  $n_R = 1$  we can calculate the minimum photon-frequency associated to a PANONE:

$$\nu_{\text{min}} = \frac{\pi m_0 c^2}{8\alpha h} \quad (34)$$

<i>Description</i>	<i>Frequency</i> [ $s^{-1}$ ]	<i>mass equivalent particle</i> [kg]
Ultraviolet	from $8 \cdot 10^{14}$ to $3 \cdot 10^{16}$	from $1,18 \cdot 10^{-35}$ to $4,42 \cdot 10^{-34}$
X-Ray	from $3 \cdot 10^{16}$ to $3 \cdot 10^{19}$	from $4,42 \cdot 10^{-34}$ to $4,42 \cdot 10^{-31}$
$\gamma$ -Ray	$> 3 \cdot 10^{19}$	$> 4,42 \cdot 10^{-31}$

Table I: "Mass equivalent particle" for typical photons.

This expression confirms and explicit the interaction between light and matter and between light and gravitational fields as well as the known effects (Compton scattering, electron-positron pair generation by gamma ray interaction with matter[3], photoelectric effect and photon-gravity interaction[4]), the same relation reveals that it's possible the transformation of matter into light and vice versa. For electron-positron pair generation by gamma ray interaction, it can be observed that this theory is fully compatible with actual model. Then we expect now that the gravity model in far field conditions is a further expression of PAN-Theory model. We'll demonstrate it.

### VIII. BY COULOMB MODEL TO GRAVITY MODEL

From mass-time eq. 22

$$ke^2 = \frac{1}{4\nu_0} \left( \frac{c^3 \mathfrak{M}_L}{4} \right) \quad (35)$$

multiplying and dividing by  $n_1 n_2 \frac{\alpha^2}{\pi^2} \lambda_0 \mathfrak{M}_L$  with  $n_1$  and  $n_2$  two positive integer numbers:

$$ke^2 = \left( \frac{1}{2n_{12}c} \right) \cdot \left( \frac{\lambda_0 \alpha^2 c^3}{\pi^2 \mathfrak{M}_L} \right) \cdot n_{12} \left( \frac{\pi \mathfrak{M}_L}{2\alpha} \right)^2 \quad (36)$$

where  $n_1 n_2 = n_{12}$ . Aesthetically and dimensionally there seems to be a certain equivalence between the Coulomb and the gravitational equations. We can write following:

$$G \triangleq \left( \frac{1}{2n_{12}c} \right) \cdot \left( \frac{\lambda_0 \alpha^2 c^3}{\pi^2 \mathfrak{M}_L} \right) \quad (37)$$

where the second factor can be wrote as:

$$\check{G} = \frac{\lambda_0 \alpha^2 c^3}{\pi^2 \mathfrak{M}_L} \quad (38)$$

so we can express the gravitational constant as:

$$G = \frac{\check{G}}{2n_{12}c} \quad (39)$$

We call  $\check{G}$  "**Electrogravitational Constant**": the constant who ties Coulomb model and Gravitational model. The constant 39 is an equation with two unknowns that has an infinite set of solutions. Of all the infinite possible solutions we choose the one obtained through the pseudo-inverse. So you get as a result:

$$\begin{cases} n_{12} = 24.989519 \\ \check{G} = 1 \frac{[m^4]}{[kg \cdot s^3]} \end{cases} \quad (40)$$

As defined  $n_{12}$  must be the product of two nonzero integers, we can approximate (accepting an error of  $\varepsilon_G \cong 419 \cdot 10^{-6}$ )  $n_{12} = 25$ . Consistent with all the assumptions that we have so far conducted, the searched  $n_{12}$  number is a perfect square. We can definitely rewrite the 36 as:

$$ke^2 = \alpha \hbar = G \left( \frac{5\pi \mathfrak{M}_L}{2\alpha} \right)^2 \quad (41)$$

The equations seem to point out that the gravitational forces are a representation in far field of PANONES who spreads out from primary matter bodies and impacts on others. The natural attraction forces between bodies in gravitational fields indicates that the electrons are responsible of the big part of PANONES emission but the big role in the PANONES interception is played from protons.

### IX. PAN-THEORY MODEL SOLUTIONS

So now we can determine all the PAN-Theory unknowns by solving the following system of linearly independent equations:

$$\begin{cases} 2\lambda_0\nu_0 = c \\ \frac{\mathfrak{M}_L}{\nu_0} = 16 \frac{\alpha \hbar}{c^2} \\ \alpha \hbar = G \left( \frac{5\pi \mathfrak{M}_L}{2\alpha} \right)^2 \end{cases} \quad (42)$$

The solutions are:

$$\begin{cases} \lambda_0 = 20\pi \sqrt{\frac{G\hbar}{\alpha c^3}} = 1,188776 \cdot 10^{-32} [m] \\ \nu_0 = \frac{1}{40\pi} \sqrt{\frac{\alpha c^5}{\hbar G}} = 1,260929 \cdot 10^{40} [s^{-1}] \\ \mathfrak{M}_L = \frac{2\alpha}{5\pi} \sqrt{\frac{\alpha \hbar}{G}} = 1,727471 \cdot 10^{-12} [kg] \end{cases} \quad (43)$$

the expression of the solutions is exceptionally similar to the expression of "**Planck's units**"[5].

### X. DETERMINATION OF THE PAN MASS $m_0$ AND OF THE PROTON RADIUS $R_p$

As defined

$$\mathfrak{M}_L = 48n_R^4 m_0 \quad (44)$$

by considering the PANONE's natural mass density  $\rho_0$  and natural diameter  $\lambda_0$  we can write:

$$\rho_0 = \frac{6}{\pi\alpha} \cdot \frac{m_0}{\lambda_0^3} \quad (45)$$

for the general primary matter mass we can write:

$$m_e = \rho_0 V_e = \frac{8n_R^3 m_0}{\alpha} \quad (46)$$



using the proton mass as  $m_e$  in the eq. 46, we can define the mass of the PAN  $m_0$ , the number  $n_R$ , the proton (and electron) radius. Substituting the 44 in the 46 we get:

$$m_e = \frac{8n_R^3}{\alpha} \cdot \frac{\mathfrak{M}}{48n_R^4} \quad (47)$$

then:

$$\mathfrak{M} = 6\alpha n_R m_e \quad (48)$$

We solve the following system:

$$\begin{cases} n_R = \frac{\mathfrak{M}}{6\alpha m_e} \\ m_0 = \frac{\mathfrak{M}}{48n_R^4} \\ R_e = n_R \lambda_0 \\ m_e = m_{proton} \end{cases} \quad (49)$$

It points out:

$$R_e = \frac{4}{3} \frac{\hbar}{c m_e} \quad (50)$$

By this relation we can express the energy of a photon in a particular form:

$$E = \frac{3}{2} \left( \frac{c R_e m_e}{\pi} \right) \nu \quad (51)$$

Eq. 51 is very similar to the Boltzmann's energy relation for a perfect mono-atomic gas. Could be the Temperature only another way to represent photons who take apart of atomic equilibrium? The numeric results obtained by solving the system 49 are the following:

$$\begin{cases} m_0 = 1,162475 \cdot 10^{-79} [kg] \\ \rho_0 = 1,811007 \cdot 10^{19} [kg \cdot m^{-3}] \\ n_R = 2,358829 \cdot 10^{16} \\ R_e = 2,804119 \cdot 10^{-16} [m] \end{cases} \quad (52)$$

where:

- $m_0$  is the mass of a PAN;
- $\rho_0$  is the natural mass density;
- $n_R$  is the number of PANONES who form a proton radius;
- $R_e$  is the proton's radius. This value for proton radius accords to the accepted value for proton radius. Recent experiments carried out for the determination of the radius of the proton agree with the CODATA value[1] which establish that radius has to be  $R_p^{CODATA} = 0,8751 \cdot 10^{-15} [m]$ .

Finally like a joke it points out :

$$\frac{R_{proton}^{CODATA}}{R_e} \cong \pi \quad (53)$$

and then we can express with negligible error the CODATA proton radius calculated with actual theories as following:

$$R_{proton}^{CODATA} = \frac{2}{3} \cdot \frac{h}{c \cdot m_{proton}} \quad (54)$$

This value is so close to last esteem about proton magnetic radius[6]. If the actual CODATA value for proton radius is the correct one and we made a journey back replacing in eq. 54 the definitions eq. 13, 46 it points a paradox:

$$\pi = 1 \quad (55)$$

Could this paradox hide a geometry problem for near field interactions used by actual measurement theory? Could the existence of a an indivisible universal brick break the euclidean space fundamentals in small scale / near field? Or is the actual CODATA proton Radius value wrong?

## XI. APPENDIX: DOPPLER EFFECT AND QUANTUM ENTANGLEMENT

### A. Doppler effect due to the observer motion

We consider a stationary body (source of PANONEs emissions) with speed  $v_m = 0$ . The PANONEs emission fronts are distant each other of exactly  $d = 2\lambda_0$ . An observer who approach the (resp. moves away from) body with speed  $v_o$  will meet the fronts in a reduced (resp. expanded) distance  $d' = d \pm \frac{v}{v_o}$ , for this motivation the frequency measured by the observer will be:

$$f_{doppler} = \frac{c}{d'} = \frac{c}{2\lambda_0 \pm \frac{v}{f_0}} = \frac{cf_0}{2\lambda_0 f_0 \pm v} \quad (56)$$

because of 3 :

$$f_{doppler} = f_0 \frac{c}{(c \pm v)} \quad (57)$$

where we adopted  $f := \nu$  in order to improve readability.

### B. Doppler effect due to the body motion

The body (source of PANONEs emissions) moves with speed  $v_m \neq 0$  and he must respect the emission's laws 1 and 2, then the PANONEs have to move with speed  $c$  respect to the body's external surface. For the sake of simplicity we'll consider the variation of emission phenomena on the elementary surfaces  $\Sigma_e$  who locate itself along the direction of motion. For a stationary body the equilibrium condition is:

$$(\check{\alpha}m_0cf_0 - \check{\alpha}m_0cf_0) \hat{r}_i = \bar{\theta} \quad (58)$$

When the body moves with constant velocity, the motion could directly impacts on the PANONEs emission speed  $c$  but this behavior is not allowed. A change of emitted PANONEs mass is also not allowed (violation of  $\alpha^{-1}$ ) because of 1. The only parameter who can changes is the emission frequency:

$$\check{\alpha}m_0(c \pm v) f_{doppler} = \check{\alpha}m_0cf_0 \quad (59)$$

and we obtain exactly the equation 57.

### C. Photonic slime and quantum entanglement

Because of Planck's constant definition in eq. 13 and because of axioms (6) and (7) we can write an equilibrium relation for each couple of emitted PANONEs:

$$(\check{\alpha}m_0(c+v) f_{doppler} + \check{\alpha}m_0(c-v) f_{doppler}) \hat{r}_i = \bar{\theta} \quad (60)$$

If a body (a classic photon) moves at the speed of light, because of eq. 60 each side of the photon who locates on the direction of motion emits with standard frequency  $\nu_0$ , each emitted PANONE has to move with speed  $c$  respect to the photon: So these two emitted PANONEs are issued with a null speed compared to a stationary outside observer to the system, then they are therefore deposited in the photon's rear relative to the direction of photon's motion.

So for each time beat the body who moves at luminary speed leaves behind a stationary trail of PANONEs pairs, we call this trail **photonic slime**.

Practically matter moving at speed  $c$  leaves behind a trace of its path. So if two photons at two different times moves along the same trajectory up to a division point in which they separate, the path that connects their topological position in the future is connected into to division point: The photons are physically connected through this drivel as inextensible rod with negligible mass. The PANONEs rotate with respect to each other as in a huge row of toothed wheels and in harmony with both photons. Since the separating point is common to the two photons they may have typically opposite spin.

If you could consider the temperature as presence of low energy photons who continuously interacts with nuclei and the magnetic field as PANONEs moving in free space, points out a relation between photon entanglement and temperature and magnetic fields[7][7, 8]. Then the entanglement can play a key role in the atomic structure. The photonic slime model could help us to understand the problem of sudden death and rebirth of entanglement[9–11].

## XII. CONCLUSIONS

The presented model seems to answer a big part of fundamental questions who animated the world last hundred years, but it opens new fundamental questions on the real atom composition, on the real nature of temperature and on the connection between PAN-Theory with quantum mechanic and relativity. A new interpretation of gravitational mass should be discussed. On the other side the simple model of PAN-Theory can offer the possibility to build simpler tests in order to confirm, exclude or compare each other the actual theories.

Finally we can conclude that the PAN exists as fundamental brick of the universe in two forms (positive and negative) and his existence is not direct demonstrable: we are able to define all the parameters of a PAN but a PAN doesn't goes around alone and then we can never meet it. Could this be fundamental confirmation of Kurt Gödel's incompleteness theorem[12]?

No living form can understand the fundamentals of universe. A man neural network is the ability and on the same time the limit of observation: you can observe because you are a man and you can't understand because you are a man.

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